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**FIT5094 IT for Management Decision Making**

DSS Documentation – EIC

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# INTRODUCTION

## Purpose of Documentation

This document is prepared to model initial business requirements of an insurance company EIC (Elite Insurance Company). This documentation will build a comprehensive and accurate model to show how a 40 year scenario will play out for EIC. Stella Architecture, an industry standard modelling tool is used to prepare this model.

## Background

Since EIC is a new organisation, there are multiple operational decisions to be taken in order to set the ground running. These decisions will affect the company in major ways. Therefore, there is a growing demand in the company that sound decisions made by the company higher ups need a DSS system to see how their decisions and assumptions are affecting the operational efficiency of the organisation.

## Scope

EIC is an insurance company specialising in sale, management and underwriting of insurance products in Australia. The initial product line includes comprehensive third part vehicle insurance. There are multiple fronts on which decisions are to be taken hence a DSS will assist the CEO in finalising these decisions and assumptions.

The model will play out a 40 year scenario for the company with possibilities of tweaking variables to see how they can be influenced.

## Intended Audience

This model and report is intended by the DSS analysts and EIC higher ups. The model can be used to see how their decisions and assumptions will play out in a 40 year simulation.

The model can then be changed through the dashboard to help understand how some variables affect the situation and impact the company.

# Stella Environment

Stella stands for Systems Thinking for Education and Research. Stella architecture is an industry standard comprehensive tool for making system models and simulate them on set parameters. Stella uses different components to help model a scenario. These components interact with each other to play out a model. Stella gives the opportunity to visually view the components, which make modelling much more easier. (Stella Help, 2018)

Stella also has an option to make dashboards and stories to see how in real time the simulation plays. Visual elements like graphs, tables, Variable nobs etc are seen in the interface tab on stella.

The main model window of Stella Architecture allows the use of elements/building blocks of stella like stocks, flows, converters etc to build the model. A user can use basic arithmetic operations to make relations between these elements. (Stella Help, 2018)

# System Documentation

## Components/Elements/Building Blocks of Stella

### Stocks

Stocks are main containers that save and pass on values of the variable at the crux of the analysis. Stocks control the main flow of the model mainline. In our model to simulate EIC’s first 40 year scenario, there are 3 stocks, summarised in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Stock Name** | **Description** | **Unit** | **Initial Value** |
| Basic Member | Basic members are all the customers that sign up for an insurance product provided by EIC. EIC automatically gives all customers the Basic Membership. Customers are acquired through word of mouth and the marketing efforts of EIC. | People | 0 |
| Priority Member | These are the members that stayed with EIC for a period of 10 years at least. EIC rewards these members by making them Priority Members which gives them added benefits. | People | 0 |
| Priority Plus Member | These are the members that stayed with EIC for a period of 25 years at least. EIC rewards these members by making them Priority Plus Members which gives them more additional benefits. | People | 0 |

Table 1: Stocks

*Characteristics*

An initial value of stocks can be added. Option to do so pops up on double clicking the stock on the model window. As per EIC business requirements, the initial values of all stocks is 0 (EIC is a new company which is yet to start operations, hence no customers[members]).

You can also add units to these stocks (At the very bottom). These feature give a better understanding of the stocks used and adds to the overall comprehensiveness of the report.

Graphical user interface, application

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Figure 1: Characteristics of Stocks

### Converters

Converters are elements of Stella that are used to input some data that influences the flow of values. These converters can either be constant value or graphical values with discrete, continuous and Extrapolated. \*Note: These discrete values cannot have more points than the simulation period. These converters once placed in the model can be used to perform various arithmetic operations with other converters or stocks.

In our model we have used 3 types of converters:

1. Constant Converters: Converters that use 1 constant value in the model.

|  |  |  |
| --- | --- | --- |
| **Converter Identifier** | **Description** | **Value** |
| Marketing Impact Factor | Marketing impact factor if multiplied with the Annual Marketing spend will give the number of customers acquired through marketing efforts. | 0.002 |
| Annual Marketing Spend | The amount of money EIC has planned to allocate to marketing efforts to attract new customers | 250,000 $ |
| Word of Mouth Factor | Word of Mouth factor if multiplied with the total number of ‘existing’ members, will give the number of customers acquired through word of mouth. | 0.002 |
| No of members to cover fixed cost | These are the minimum number of members(customers) needed by EIC to break even in fixed cost. i.e. to cover the fixed cost of equipment, building, etc. | 600 |

Table 2: Constant Converters

1. Graphical Converters: Converters that use discrete, continuous or extrapolated graphical values

|  |  |  |
| --- | --- | --- |
| **Converter Identifier** | **Description** | **Value** |
| Economic Factor (Market Spend) | Economic factor on market spend helps to model to factor the effectiveness of the marketing spend. i.e: How effectively will the money spent on marketing translate to addition of new members. This 8 year cycle is repeated 5 times to simulate all 40 years. | Year 1,2 – 100%  Year 3,4 – 150%  Year 5,6 – 80%  Year 7,8 – 200% |
| Time Factor | The converter is introduced to have a converters which can index the time period of the simulation so that members can shift from basic to priority to priority plus. | Year 1 – 1  Year 2 – 2  Year 3 – 3  Year 4 – 4  .  .  .  Year 40 - 40 |
| Loyalty Factor | The competition also affects how members leave EIC(their loyalty). Hence this converter has values which depicts how strong the competition each year. The higher the number, the more loyal members are to EIC | Year 1 to 10 – 1  Year 10 to 20 – 1.25  Year 20 to 30 – 0.8  Year 30 to 40 – 0.5 |
| No of Service Representatives | These are the planned number of representatives EIC wants to hire to help service customer | Year 1 to 10 – 35  Year 10 to 20 – 40  Year 20 to 30 – 50  Year 30 to 40 – 65 |

Table 2: Graphical Converters

1. Computational Converters: These converters are derived from arithmetic operations on 2 or more converters

|  |  |  |
| --- | --- | --- |
| **Converter Identifier** | **Description** | **Computation Formula** |
| Marketing Acquired Customers | This converter depicts the value of no of new members that were acquired through marketing efforts of EIC given the economic factor. | Marketing\_Impact\_Factor\*Annual\_Marketing\_Spend\*"Economic\_factor\_(Market\_Spend)" |
| Total no. of Members | This is the value of total members EIC has at a given point in time (Basic + Priority + priority plus) | Priority\_Plus\_Member+Priority\_Member+Basic\_Member |
| Potential Word of Mouth members | This converter depicts the value of no of new members that were acquired through the word of mouth of existing customers. | "Total\_no.\_of\_Members"\*"Word\_of\_Mouth\_(Factor)" |
| Total Discontinuations | This converter depicts the value of total number of members that left EIC due to low loyalty | "Discontinuation\_Rate\_(Priority\_Plus)"+"Discontinuation\_Rate\_(Priority)"+"Discontinuation\_Rate\_(Basic)" |
| EIC Optimal Load  (Customer Satisfaction) | This converter signifies what the optimal load for EIC customer satisfaction is.  According to business requirements, 1 service representative can serve upto 30 members without them feeling left out. Therefore, optimal load is the number of members that can be serviced ‘happily’ given a number of service representatives. | No\_of\_Service\_Representatives\*30 |
| No of Members to cover variable cost. | These are the minimum number of members(customers) needed by EIC to break even in variable cost. i.e. to cover the variable cost of service representatives. According to business requirements, 5 EIC members take up the cost of 1 service representative. | No\_of\_Service\_Representatives\*5 |
| Profitable Load | Total number of EIC members needed to be a profitable business. Since costs to be covered are in 2 categories( fixed and variable), hence the profitable load would be the addition of EIC members needed in covering both type of costs. | No\_of\_Members\_to\_cover\_Variable\_Cost+No\_of\_Members\_to\_cover\_Fixed\_Cost |

Table 4: Computational Converters

### Flows

Flows are like taps which control the flow of values in a model. The flow of values between stocks are monitored by these flows. The flow has an arrow head which points in the direct of the flow. 1 flow can only be uni directional.

In our scenario, 6 flows are used to pipeline the model. These flows work on some conditions or equations which makes the basis for flow logic.

|  |  |  |
| --- | --- | --- |
| **Flow Identifier** | **Description** | **Flow Equation** |
| Customer Acquisition rate | Control the number of new EIC customers(members) that are obtained by EIC through word of mouth and marketing efforts. | Marketing\_Acquired\_Customers+Potential\_Word\_of\_Mouth\_Members |
| Basic to Priority | Controls the number of Members which are promoted from Basic level to Priority level depending on their years of being an EIC insurance holder. | IF(Time\_Factor>10) THEN (Basic\_Member) ELSE 0 |
| Priority to Priority Plus | Controls the number of Members which are promoted from Priority level to Priority Plus level depending on their years of being an EIC insurance holder. | IF(Time\_Factor>25) THEN (Priority\_Member) ELSE 0 |
| Discontinuation Rate (Basic) | Control the number of EIC Basic Members that leave EIC due to lower customer loyalty and also basic assumptions as per business requirements. | Basic\_Member\*0.64/Loyalty\_Factor |
| Discontinuation Rate (Priority) | Control the number of EIC Priority Members that leave EIC due to lower customer loyalty and also basic assumptions as per business requirements. | Priority\_Member\*0.42/Loyalty\_Factor |
| Discontinuation Rate (Priority Plus) | Control the number of EIC Priority Plus Members that leave EIC due to lower customer loyalty and also basic assumptions as per business requirements. | Priority\_Plus\_Member\*0.27/Loyalty\_Factor |

Table 5: Flows

### 3.1.4 Connectors

Connectors are another building blocks of Stella architecture which helps connect 2 elements (Stocks, flows, converters) which each other. \*Note: This connection only marks transfer of information and not the actual flow. The below shown figure shows us how the connections are made. Once a connection is made, the value of that variable can be used in arithmetic calculations to the converter it is connected to.

Diagram

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Figure 2: Connectors Connecting Various Converters

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Figure 3: Converter setting showing use of other connected converters in arithmetic operations

## Running the Model

The initial running specifications of the model are given as business requirements in the scenario description. Various inputs like the total length of simulation, differential time(dT), the unit of time used, etc.

EIC required the model to forecast the business scenario of the first 40 years of commencement of company operations. The forecasting of membership levels and discontinuation rates are done over 40 years and computed annually. Below is a figure which shows the overview of the EIC model

Diagram

Description automatically generatedFigure 4: EIC Stella Architecture Model

The below is the specifications window where time unit input and length of simulation can be input. The picture highlights the input that were inferred from the business requirements.

Graphical user interface, application, email

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Figure 5: Specifications page to input business requirements.

## Interface and Story

Stella also affords its users to make an interface of the model with visual elements, making it even further easy to visualise. Simulation can be run real time and how graphs and tables are formed with each differential time (dT).

Stories use sequence of pages to form a movie like motion flipping through these pages. This makes the user understand how step by step the model was built and at each page, the user can see comments that further elaborate the modelling process.

Below are the Interface Pages used to elaborate on the model:

Graphical user interface, application

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Graphical user interface, application

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Figure 7: Page 2 of the Interface

Graphical user interface, application, table

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# Conclusion

The report starts with providing a general overview of the ideation process of business modelling and the general behaviour of a stella architecture model. Each component/building block of the stella architecture used in the reported model is explained In detail with explanations using figures. The report gives a detailed account of all these components/building blocks used in the reported model for EIC in a tabular form. The intended audience can also tweak the variables to see how the simulation reacts to these changes using the interface window.

The report depicts various ways a model can reflect its changes. Although the intended audience can use the model and the interface window both, to see how the model responds to changes can be much easily viewed in the interface window. This model (interface combined) can be used by company higher ups and DSS analysts to simulate business scenario and see first-hand how their assumptions affect the company.

# Reference

Stella Help. (2018). *Stella online Help, tutorials, and printed documentation.* Retrieved from Stella and iThink Version 1.9.5.